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To our readers . . .

In the September issue, Fr. William T. Suchan, S.J. reported briefly on the recent college-high school conference held in the Buffalo Province. We are publishing in this issue the minutes of that meeting, as an example of successful articulation between college and high school. The minutes were made available to us through the kindness of Fr. James J. Ruddick, S.J. We are also most grateful to Fr. Cornelius J. Carr, S.J., Province Prefect of Studies for High Schools, for permission to print the minutes, and for writing an introductory note to accompany them.

Another curriculum conference should be of interest to readers of the BULLETIN, and we plan to report on it in a future issue. At the end of August, the Central Region Inter-Province Conference of Jesuit High School Teachers of Sciences and Mathematics was held at Marquette University. This BULLETIN should be able to serve a useful purpose in keeping our readers throughout the country aware of the various province-wide and inter-province activities in scientific education. The previous surveys conducted in these pages have shown the common interests and concerns throughout the country on the college and university level, and in a future issue we will publish a survey of Jesuit scientific education on the high school level. We welcome any suggestions for making this country-wide exchange of information more effective, and only regret that a limitation in time narrows the extent of our efforts.

The annual meeting at Boston College was of special interest this year because of the provocative panel discussion on "The future of Jesuit scientific education and research." Unfortunately, we were not able to meet the printer's deadline with the transcript of that discussion, but will publish it in the next issue. At the Boston meeting the executive council planned another panel discussion for the 1964 meeting at Canisius College in Buffalo. The topic will be "The present purpose and aims of the Association." This topic was basic to much of the discussion at the Boston College meeting, and has been a constantly recurring question, most recently evoked by the questionnaire on the BULLETIN (see the March issue).

Since this is my last issue as editor of the BULLETIN, I would like publicly to thank the staff of the BULLETIN for their generous help. I am also grateful to the many others who have cooperated with us over the past few years. Mr. George V. Coyne, S.J., currently news editor, will be the new editor-in-chief.

BUFFALO PROVINCE COLLEGE-HIGH SCHOOL CURRICULUM CONFERENCE

Introductory note. It has been the strong belief of the Buffalo Province high schools that, since they are by nature college preparatory, their curriculum direction should be determined in great part by the colleges for which they profess to prepare their students. With this in mind, two curriculum conferences were held at McQuaid Jesuit High School early in 1963. To them were invited the deans of the two province colleges and the college department chairmen whose subjects were under discussion. Their counterparts on the high school level were also present. Excerpts from the minutes of one of these conferences follow.

It might be of interest to readers of this BULLETIN to know that as a result of the conference discussions, the Buffalo Province has modified its course of studies to allow for more science, mathematics, and modern languages for all its high school students.

Fr. Cornelius J. Carr, S.J.
Buffalo Province
Prefect of Studies for High
Schools

MINUTES

The first session of the Buffalo Province College-High School Curriculum Conference was held at McQuaid Jesuit High School on February 10, 1963. Present at the session were Fr. Joseph C. Glose, S.J., province prefect for colleges, who presided, Fr. Cornelius J. Carr, S.J., province prefect for high schools, Fr. Donald L. Kirsch, S.J., rector of Canisius High School, Fr. Edward I. Dolan, S.J., principal of Canisius High School, Fr. Edward F. Maloney, S.J., dean of Canisius College, Fr. Robert A. Mitchell, S.J., dean of LeMoyne College. Fr. Robert F. Grewen, S.J., rector of McQuaid Jesuit High School, attended the afternoon sessions. Other participants represented the subject areas under discussion as follows: *Mathematics*—Fr. Thomas E. Fleming, S.J., (Canisius High School), Mr. Thomas R. Seymour (McQuaid) and Dr. Robert F. Tidd (Canisius College); *Physics*—Fr. Robert O. Brennan, S.J., (LeMoyne), Fr. Frederick J. Reisert, S.J., (Canisius High School), Fr. James J. Ruddick, S.J., (Canisius College) and Fr. William T. Suchan, S.J. (McQuaid); *Chemistry*—Dr. Herman A. Szymanski (Canisius College), Fr. Alvin A. Hufnagel, S.J., (Canisius High School), Fr. William J. McBride, S.J., (McQuaid) and Fr. Clarence C. Schubert, S.J., (LeMoyne).

MATHEMATICS

For boys capable of advanced placement work in high school, the committee recommended the following alternate plans:

	I	II	III
<i>Freshman</i>			
Sem I	Elementary Algebra	Elementary Algebra	Elementary Algebra
Sem II	Intermediate Algebra	Geometry (Part I)	Elementary Algebra
<i>Sophomore</i>			
Sem I	Plane & Solid Geometry	Geometry (Part II)	Geometry
Sem II	Plane & Solid Geometry	Intermediate Algebra and Trigonometry (fused)	Geometry
<i>Junior</i>			
Sem I	Trigonometry	Math 11 (Part II)	Intermediate Algebra
Sem II	Advanced Algebra	Advanced Algebra	Trigonometry
<i>Senior</i>			
Sem I	Analytic Calculus	Calculus	College Algebra
Sem II	Analytic Calculus	Calculus	Analytic Calculus

Plan III is already in use in the Jesuit high schools up to the senior level. It is now proposed to take a group of very select seniors from both Greek and Science courses and give them the senior year mathematics as indicated here, allowing the other senior mathematics students to follow the traditional program.

The following additional recommendations were made:

1) *On the high school level:* the good basic boys and the Greek boys who presently receive no mathematics in senior year should be given mathematics to prevent the year's mathematics vacuity which is bound to hurt them in college if they intend to continue in a field requiring mathematics.

2) *On the college level:* for terminal students in mathematics, have a course emphasizing the foundations of mathematics more than emphasizing skills, e.g., logic, group field theory, introduction to analysis, to statistics, to finite mathematics, etc.

PHYSICS

The committee thinks that

1) for physics majors in college, the advanced placement program in mathematics is particularly valuable;

2) for non-physics majors, it would be advantageous to have advanced placement in physics so as to have more time available for their specialty—pre-med, chemistry or whatever;

3) for very few select science honors students in high school, it would be advisable in senior year to take a period or two in which they would go over additional problems in the matter being covered in class. This would prepare these five or six boys to take the advanced placement examination in physics.

CHEMISTRY

The colleges expressed the desire that entering students should have

- 1) enough mathematics to begin analytic geometry and calculus;
- 2) a course in physics and chemistry and, if possible, biology (these courses should be built on the American Chemical Society's study plans to avoid duplication);
- 3) one language: German, French or Russian from two to four years;
- 4) four years of English;
- 5) some social science;
- 6) advanced courses if time permits.

It was suggested that the American Chemical Society examinations be given in high schools as final examinations from time to time. Such examinations would give the boys the feeling of being in national competition, and would give the schools a measure for their courses.

Additional suggestions for fostering relations between the high schools and colleges were made:

- 1) a newsletter to pass information from group to group;
- 2) awards to be offered by the colleges to outstanding high school science students once a year;
- 3) some high school course work to be taken at the college.

Advanced placement in chemistry was not recommended for the following reasons:

- 1) high schools would be required to have qualitative and quantitative analysis courses which would necessitate more laboratory and more time;
- 2) the goal set by the colleges is not to get out of school fast, but to get into a good graduate school.

So that boys not in a science honors course in high school could still become science majors in college, more science and more mathematics is needed in high school. A boy from a Jesuit high school has great difficulty otherwise.

Jesuit high school students have the greatest difficulty in using mathematics and in thinking problems through. This weakness shows itself in mathematics courses, physical chemistry courses and in the theoretical courses in graduate school. They have no trouble with organic chemistry courses or descriptive courses.

The committee split on the value of high school chemistry. Some felt a boy found college chemistry extremely difficult if he had not had it. Others said if a choice had to be made in high school, a boy had better take more mathematics than a course in chemistry.

DOCTORATES IN THE NATURAL SCIENCES IN AMERICAN THEOLOGATES

TIMOTHY E. TOOHIG, S.J.

Introduction. The following is a summary listing of those holding doctorates in the natural sciences in the theologates of the North American Assistancy for the academic year 1963-64. Included in this listing are two degrees in engineering and one in the philosophy of science. We have also listed the five tertians who were in fourth year theology when the survey was begun last year.

The survey was limited to doctorates, simply because that seemed to be the only manageable criterion in terms of sheer numbers, and because of the wide variation in interest and commitment on the part of those with bachelor's and master's degrees.

As far as could be ascertained, there are no doctorates among the theologians at Montreal.

Format. The listing is broken down by theologate, major field, and year in theology. For each individual we have listed: his province, school and year of degree, special field(s) of interest, and title of dissertation.

Tables I, II, and III analyze the data according to fields, provinces, theologates, and schools. The sampling is so small that one should be wary in drawing any conclusions, although some features stand out. It should be noted that data from the tertianships have not been included in the tables.

Acknowledgements. A special word of thanks is due to Mr. Donald Merrifield at Alma, Fr. James Finnerty at St. Mary's, Fr. Ernest Spittler and Mr. Thomas Spittler at West Baden, Mr. Donald Plocke and Mr. William Callahan at Weston, and Mr. Edward Nemeth at Willowdale, for their cooperation in collecting and forwarding the information from their respective houses.

ALMA COLLEGE

Chemistry

Third Year

Dachauer, Andrew (*Calif.*); Fordham University, 1962; Organic chemistry, chemical engineering; "Deuterium isotope effect in free radical reactions of t-carbon deuterated DDT and its analogues."

Mathematics*Second Year*

Koehler, John (*Ore.*); University of Washington, 1962; Algebra, game theory; "The type set of a torsion-free group of finite rank."

First Year

Manjarrez, Victor (*Calif.*); Harvard University, 1963; Analysis, abstract analysis, foundations of quantum mechanics; "Polynomial bases for compact sets in the plane."

Physics*Second Year*

Doherty, Patrick (*Calif.*); St. Louis University, 1962; Plasma physics, neutron physics, applications of digital computers to physics; "Temperature measurements of plasma by neutron scattering."

Merrifield, Donald (*Calif.*); Massachusetts Institute of Technology, 1962; Molecular quantum mechanics, applications of digital computers to physics; "A configuration interaction study of the electronic states of the water molecule."

Engineering*Third Year*

Luthman, Elmer (*Calif.*); Stanford University, 1961; Network synthesis, solid-state applications, applications of analog and digital computers to engineering, lasers; "A potential analogy approach to linear phase filter design." (Professional engineering degree in electrical engineering.)

Second Year

Arenz, Robert J. (*Calif.*); California Institute of Technology, 1964; Solid mechanics, aeronautics and space sciences; "Theoretical and experimental studies of wave propagation in viscoelastic materials." (Ph.D. in aeronautical engineering.)

REGIS COLLEGE (WILLOWDALE)

Biology*First Year*

Dundon, Thomas R. (*Wisc.*); St. Louis University, 1963; Cecidology; "Ontogenesis of three pachypsylla galls on coltis."

Chemistry*Second Year*

Elder, John W. (*Mo.*); Loyola University (Chicago), 1962; Organic chemistry, natural products; "Chemistry of substituted picric acids."

Nemeth, Edward M. (*Det.*); Loyola University (Chicago), 1963; Physical chemistry; "The reactions of alcohol vapors with sodium vapor."

ST. MARY'S COLLEGE

Biology

First Year

Muckenthaler, Florian (*Mo.*); Catholic University, 1964; Cytology; "Autoradiographic study of nucleic acid synthesis during spermatogenesis in the grasshopper, *Melanoplus differentialis*."

Chemistry

Fourth Year

Finnerty, James L. (*Wisc.*); Loyola University (Chicago), 1960; Organic chemistry; "The rearrangement of 3,3,3-triarylpropionic acids in the Hunsdiecker reaction."

Second Year

Swenson, George W. (*Wisc.*); Loyola University (Chicago), 1963; Physical chemistry; "A new instrument for the measurement of quantum yields of photoluminescence."

Mathematics

First Year

Conlon, Lawrence (*Mo.*); Harvard University, 1963; Differential geometry, Morse-Bott theory; "Spaces of paths on a symmetric space."

Physics

First Year

Marlow, Ransom (*N.O.*); Georgetown University, 1964; Theoretical physics; "A unified Dirac-von Neumann Lagrangian formulation of quantum mechanics."

WEST BADEN COLLEGE

Biology

Fourth Year

Acker, Thomas S. (*Det.*); Stanford University, 1960; Insect morphology and evolution, anthropoid development and evolution, human evolution and creation; "The comparative morphology of the male terminalia of Neuroptera." (Insects)

First Year

Lovell, Richard A. (*Chi.*); McGill University, 1963; Neurophysiology; "On the equivalence, content and state of *gamma*-aminobutyric acid and factor I in mammalian brain."

Chemistry*Third Year*

Spittler, Thomas M. (*Det.*); Loyola University (Chicago), 1961; Inorganic analytical, infrared, isotope exchange reactions; "Oxygen-18 exchange in the system $\text{CO}_2^*-\text{H}_2\text{SO}_4$ and $\text{SO}_2^*-\text{H}_2\text{SO}_4$."

Philosophy of science*Second Year*

Sikora, Joseph J. (*Chi.*); University of Notre Dame, 1958; Philosophy of science, astronomy; "Object and method in the philosophy of nature and physical science."

WESTON COLLEGE

Biology*Third Year*

Plocke, Donald J. (*N.E.*); Massachusetts Institute of Technology, 1961; Molecular biology, especially mechanism of enzyme action; "Alkaline phosphatase of *Escherichia coli*: a zinc metalloenzyme."

Chemistry*Third Year*

Clarke, David M. (*Ore.*); Northwestern University, 1953; Quantum mechanics, geophysics; "Diffusion of sucrose in glucose solutions."

First Year

Phillips, Roger (*N.E.*); University of Pennsylvania, 1963; Physical chemistry; "The role of ionization and cation complex formation in the thermodynamics of the hydrolysis of ATP and other high energy phosphates."

Physics*Second Year*

Callahan, William R. (*N.E.*); Johns Hopkins University, 1962; Spectroscopy; "Spectrum of doubly-ionized gadolinium."

WOODSTOCK COLLEGE

Biology*Second Year*

Baumiller, Robert C. (*Md.*); St. Louis University, 1961; Radiation genetics (*Drosophila*), human genetics; "The effects of X-ray-induced euploid and near-euploid mutants in heterozygous condition upon developmental stages in *Drosophila melanogaster*."

Lesseps, Roland J. (*N.O.*); Johns Hopkins University, 1962; Developmental biology; "Electron microscopy of dissociated and reaggregated embryonic chick cells."

Mahowald, Anthony P. (*Wisc.*); Johns Hopkins University, 1962; Developmental cytology and genetics, electron microscopy of developing systems; "Electron microscopy of *Drosophila melanogaster* embryos: I. Formation of cellular blastoderm; II. Pole cells and the ontogeny of the polar granules."

First Year

Fitzgerald, Robert S. (*Det.*); University of Chicago, 1963; Chemical control of respiration; "Ventilatory response to transient perfusion of the carotid chemoreceptors."

Chemistry

Fourth Year

Currie, Charles L. (*Md.*); Catholic University, 1960; Physical chemistry, photochemistry, molecular spectroscopy; "Vapor-phase photolysis of methyl azide."

Third Year

Salmon, James F. (*Md.*); University of Pennsylvania, 1961; Inorganic chemistry; "Some properties of tetramethyldisiloxydialuminum and interaction of boron phosphide diiodide with ammonia and ethylamine."

Second Year

Salamone, Ramon A. (*N.Y.*); Fordham University, 1963; Organic chemistry; "The synthesis and toxicity of some prolan analogs."

First Year

Lambert, James L. (*N.O.*); Johns Hopkins University, 1963; Organic chemistry, stereochemistry and reaction mechanics; "Homoenolate anions."

St. George, John P. (*N.Y.*); Fordham University, (Cand.); Organic spectroscopy.

Mathematics

Fourth Year

Brande, Edward W. (*N.Y.*); St. Louis University, 1961; Number theory; "The representation of quinary quadratic forms by binary quadratic forms."

Whitman, Andrew P. (*N.O.*); Catholic University, 1960; Abstract differential geometry, differential topology, Lie groups; "Invariant connections in principal fiber bundles over locally homogeneous spaces."

Third Year

Lutts, John A. (*Md.*); University of Pennsylvania, 1961; Topologico-

functional analysis, Lie groups-Lie algebra; "Some imbedding properties of locally compact Hausdorff spaces which possess unisolvent systems."

First Year

Bagnato, Robert A. (N.Y.); Yeshiva University, 1963; Schwartzian distributions and partial differential equations; "Gevrey classes and hypoellipticity."

Sauve, James W. (Wisc.); Johns Hopkins University, 1964; Differential equations, Lie groups; "A reduction of the equations of motion of three bodies by the use of Lie groups."

Physics and Astrophysics

Fourth Year

Pendergast, Richard J. (N.Y.); St. Louis University, 1960; Elementary particle physics (theoretical); "Application of a reduced relativistic wave equation to spin-lattice relaxation in paramagnetic salts."

Third Year

Brungs, Robert A. J. (Md.); St. Louis University, 1962; Semiconductor physics, solid state; "Semiconductor properties of monocrystalline boron."

Dehn, James T. (N.Y.); Georgetown University, 1962; Chemical physics; "Roothaan's molecular orbital theory for closed- and open-shell systems, and its extension to include the variation of orbital exponents."

Second Year

Badillo, Victor L. (Philip.); St. Louis University, 1963; X-ray crystallography, atmospheric electromagnetism; "The atomic radial density distribution in virus proteins by X-ray scattering."

Coyne, George V. (Md.); Georgetown University, 1962; Spectrophotometry, planetary physics; "Comparative spectrophotometry of selected areas on the lunar surface."

Esquivel, Agerico L. (Philip.); St. Louis University, 1963; Electron diffraction (atomic & electron physics); "Diffraction of electrons by non-crystalline TMV and TYMV."

Toohig, Timothy E. (N.E.); Johns Hopkins University, 1962; Elementary particle physics (experimental); "The existence and production of the Eta and Omega mesons."

First Year

Marzolf, John G. (Buf.); Johns Hopkins University, 1963; Mössbauer effect, gamma ray resonance scattering, solid state (lattice dynamics); "Single crystal diffraction profiles for monochromatic radiation."

TERTIANSHIPS

Biology

Lorenzo, Michael A. (*Md.*); St. Louis University, 1959; Zoology, invertebrate neurohistology; "The cephalic nervous system of the centipede *Arenophilus bipuncticeps* (Wood) (Chilopoda, Geophilomorpha, Geophilidae)."

Ruggieri, George D. (*Md.*); St. Louis University, 1960; Experimental morphogenesis, marine pharmacotoxicology; "The effects of holothurin, a steroid saponin from the sea cucumber, on the development of the sea urchin."

Mathematics

Smith, James F. (*Buf.*); Catholic University, 1959; Functional analysis; "Structure theorems for certain classes of scalar-product algebras."

Chemistry

Spittler, Ernest G. (*Det.*); Catholic University, 1959; Photochemistry, radiation chemistry, history and philosophy of science; "The mercury-photosensitized decomposition of dimethyl ether."

Valenta, John G. (*Mo.*); St. Louis University, 1962; Organic chemistry; "The kinetic applications of the H_0 acidity function values of the four acids, perchloric, sulfuric, p-toluene-sulfonic, and camphorsulfonic in acetic acid solutions."

TABLE I
Doctorates by Province and Field

	TOTAL	BIOLOGY	CHEMISTRY	MATHEMATICS	PHYSICS
Buffalo	1	0	0	0	1
California	6 ^a	0	1	1	2
Upper Canada	0	0	0	0	0
Chicago	2 ^b	1	0	0	0
Detroit	4	2	2	0	0
Maryland	6	1	2	1	2 ^c
Missouri	3	1	1	1	0
New England	4	1	1	0	2
New Orleans	4	1	1	1	1
New York	6	0	2	2	2
Oregon	2	0	1	1	0
Philippines	2	0	0	0	2
Wisconsin	5	2	2	1	0
—	—	—	—	—	—
	45	9	13	8	12

^a This number includes two degrees in engineering.

^b This number includes one degree in the philosophy of science.

^c This number includes one degree in astronomy.

TABLE II
Doctorates by Theologate and Field

	TOTAL	BIOLOGY	CHEMISTRY	MATHEMATICS	PHYSICS
Alma	7 ^a	0	1	2	2
St. Mary's	5	1	2	1	1
West Baden	4 ^b	2	1	0	0
Weston	4	1	2	0	1
Willowdale	3	1	2	0	0
Woodstock	22	4	5	5	8 ^c
—	—	—	—	—	—
	45	9	13	8	12

^a This number includes two degrees in engineering.

^b This number includes one degrees in the philosophy of science.

^c This number includes one degrees in astronomy.

TABLE III
Doctorates by School and Field

	TOTAL	BIOLOGY	CHEMISTRY	MATHEMATICS	PHYSICS
Catholic U.	3	1	1	1	0
Fordham	3	0	3	0	0
Georgetown	3	0	0	0	3 ^e
Loyola (Chi.)	5	0	5	0	0
Notre Dame	1 ^b	0	0	0	0
St. Louis	8	2	0	1	5
Cal Tech	1 ^d	0	0	0	0
Chicago	1	1	0	0	0
Johns Hopkins	7	2	1	1	3
Harvard	2	0	0	2	0
MIT	2	1	0	0	1
McGill	1	1	0	0	0
Northwestern	1	0	1	0	0
Pennsylvania	3	0	2	1	0
Stanford	2 ^d	1	0	0	0
Washington	1	0	0	1	0
Yeshiva	1	0	0	1	0
—	—	—	—	—	—
	45	9	13	8	12

^b As above

^c As above

^d This number includes one degree in engineering

REPORTS OF SCIENTIFIC ACTIVITY

HIGH SCHOOLS

Canisius High School. For the fifth consecutive year Fr. Frederick J. Reisert, S.J. is conducting science seminar meetings for seventy high school students. The students are carefully selected by the teachers of seven Catholic high schools for their ability and interest in the sciences. Lectures are given one evening each week by research scientists, teachers and medical doctors. This program is meant not only to supplement the work of the classroom but also to bring students to an awareness of various vocational opportunities. During the current year the two senior honors classes are using Miller's College Physics.

Fr. Frederick J. Reisert, S.J.

Xavier High School (New York). During the last three years a reading program in the paperback books of the PSSC Science Study Series has been conducted at Xavier. The purpose of the program is to help students to improve their critical judgment in reading material of a scientific nature. Three times a year students were required to submit a review of a book chosen by them from those in the series. The program was found to be particularly helpful in fostering intelligent, thoughtful criticism of what was read.

Mr. Joseph S. Rooney, S.J.

COLLEGES AND UNIVERSITIES

Boston College. The annual meeting of the Eastern Section of the Seismological Society of America was held from October 17-19 at Boston College. Seventy-five scientists attended the meeting and presented papers on recent developments in the field of seismology.

Fr. James W. Skehan, S.J.

Fordham University. Two new members have joined the science faculties of Fordham. Dr. Levente Szasz has joined the staff of the physics department as assistant professor of physics. Dr. Szasz, whose fields of specialty are atomic physics and the many-body problem, was educated at Budapest and Munich and for the last few years has been a research associate at MIT. The newest member of the chemistry faculty is Dr. Richard W. Franck, assuming the post of assistant professor of organic chemistry.

Dr. Franck, who did his undergraduate work at Amherst College and graduate work at the University of Wisconsin and Stanford University, has recently completed a post-doctoral research appointment at MIT.

Chemistry. Dr. Bartholomew Nagy is currently on a two year leave of absence at the University of California, San Diego, where he will continue his meteorite research. Dr. Douglas J. Hennessy is at present on a sabbatical leave visiting research entomologists and pesticide chemists at the Universities of California, Illinois, Oregon and Western Ontario, the J. R. Geigy Company of Basel, Switzerland and the Pest Infection Laboratory at Slough, England.

Dr. Emil J. Moriconi presented a paper, co-authored with Francis Creegan and Dr. F. A. Spano, to the International Union of Pure and Applied Chemistry in London. The title of the paper was "Isocarbostyryl derivatives via ring expansion of 2-alkyl-1-indanones and ozonization of isoquinoline 2-oxides."

Dr. Leo K. Yanowski has been reappointed as chairman of the New York ACS Radio Committee, a post which he has held since 1953. As chairman of this committee, Dr. Yanowski conducts a fifteen minute radio program entitled "Everybody's Chemistry".

Dr. Walter Schubert presented a lecture on the "Fungal degradation of lignin" at the Gordon Research Conference on microbiological deterioration held at Hampton, New Hampshire during the past summer. A paper entitled "Hydrogenation of milled bagasse lignin," co-authored by Dr. Nord, Dr. Schubert and Michael Reale, was presented at the September meetings of the ACS in New York.

Of the sixteen chemistry majors graduated this year, nine are going to continue their studies at the following graduate schools: Columbia University (3), University of Wisconsin (2), Minnesota, Pennsylvania State, New York and Purdue Universities (1 each).

Research equipment recently acquired by the department includes a Cary 15 recording spectrophotometer, Varian Associates A-60 NMR spectrometer, and a Perkin Elmer 337 grating spectrophotometer.

Fr. Robert D. Cloney, S.J.

Physics. The physics department has received a grant of \$21,870 for undergraduate equipment under the NSF matching funds program. The money will be used to upgrade the optics, electronics, and advanced laboratories in junior and senior years. In this way it is hoped to continue the improvement begun two years ago in the freshman-sophomore physics program under a grant from the NSF Curriculum Development Committee.

Recent publications from the department include: Joseph Barrett and Alfons Weber, "Temperature Dependence of Optical Harmonic Generation in KDP and ADP Crystals," *Physical Review*, 131 (1963), 1469; Alfons

Weber and K. Tanner, "The Rotational Raman Spectrum of Cyclopentane- d_0 and Cyclopentane- d_{10} ", *Journal of Molecular Spectroscopy*, 10 (1963), 381; J. McConnell and J. Shapiro, "Covariant Statistical Treatment of Antiproton Annihilation", *Il Nuovo Cimento*, 28 (1963), 1272.

Fr. Joseph F. Mulligan, S.J.

Georgetown University. Dr. John C. Rose, a graduate of Fordham University and Georgetown University Medical School, became dean of the medical school on July 1, succeeding Dr. Hugh H. Hussey who became director of the Division of Scientific Activities of the American Medical Association. Prior to his present appointment, Dr. Rose was chairman of the department of physiology and biophysics.

Astronomy. Fr. Francis J. Heyden, S.J., under the auspices of the Air Force, conducted a successful eclipse expedition to a site near Ellsworth, Maine in the path of totality of the July solar eclipse.

Dr. Vera C. Rubin is on a year's leave of absence from Georgetown while conducting research at the University of California, La Jolla.

Fr. Martin F. McCarthy, S.J. has returned to the Vatican Observatory. While at Georgetown, in addition to his own research, he assisted Fr. Heyden in conducting the monthly colloquia for professional astronomers of the Washington area, organized a students' colloquium, assisted with student research in photoelectric photometry and spectral classification and taught the course in photometry and photography.

Two new faculty members have been added to the staff of the observatory. Dr. Robert Wilson, who obtained his doctorate from the University of Pennsylvania in 1963, will teach the course in photoelectric photometry and conduct research in this area. Dr. Harvey W. Banks has returned to Georgetown after receiving his doctorate from there in 1961 and will teach the course in orbit determination and double star orbits.

Fr. Francis J. Heyden, S.J.

Mathematics. The mathematics department was host this summer to an eight week postdoctoral research venture. Fr. Andrew P. Whitman, S.J. (N.O.) and Mr. Lawrence Conlon, S.J. (Mo.) gave an informal seminar in differential geometry. Mr. Conlon presented a series of lectures on Morse theory and its application to symmetric spaces, ending with Bott's proof of the periodicity theorem for the stable homotopy of the classical Lie groups. Fr. Whitman developed the theory of connections from the recent work of Ehresmann, Nomizu, Kobayashi, and Lichnerowicz. After both series of lectures were completed the remaining weeks were spent in presenting interesting questions for further development of the material with suggestions on possible solutions.

Dr. Malcolm W. Oliphant

Holy Cross College. According to the progress report of the Committee on Professional Training of the ACS, which was published in the March, 1963 issue of *Chemical and Engineering News*, thirteen B.S. Chemistry graduates from Holy Cross in 1962 were certified by the committee. Holy Cross has the fifth largest number of certifications of New England schools.

Chemistry. Professor William F. O'Hara has received an \$11,000 grant from the ACS Petroleum Research Fund for thermodynamic investigations. During this past summer, Professor Robert W. Ricci worked in quantum field studies under a \$5,000 grant from the Army Quartermaster Corps. An abstract by Professor Olier L. Baril entitled "Hydrocarbon azeotropes with 2-ethoxy ethanol" is published in the Petroleum Research Fund Abstracts for 1962.

Fr. Bernard A. Fiekers, S.J.

Mathematics. During the current academic year, Mr. John R. McCarthy, assistant professor of mathematics, will study probability and statistics as an NSF Science Faculty Fellow at the Catholic University of America.

The NSF In-Service Institute for high school teachers of mathematics offers a single course during 1963-64 entitled "Basic concepts of analysis." Under an NSF undergraduate research grant, four undergraduates with the direction of Dr. Patrick Shanahan and Dr. Vincent O. McBrien are conducting research in algebraic topology.

Fr. John J. MacDonnell, S.J.

St. Joseph's College. The engineering physics program, which was described in the September, 1963 issue of this BULLETIN (page 203), has been recently redesigned to enable students on cooperative assignments to specialize in such areas as aeronautical engines and aircraft engineering. Negotiations have been completed with NASA to place qualified students in several research centers along the eastern coast, specifically at the Goddard Space Flight Center, Greenbelt, Maryland and the Langley Research Center, Hampton, Virginia. Negotiations are also under way with the George C. Marshall Space Flight Center in Huntsville, Alabama. During the summer Fr. John S. O'Connor, S.J., who is directing the cooperative engineering physics program, visited the Cape Canaveral launching site at Cocoa Beach, Florida, as well as the Langley Research Center, where a great deal of preparatory work in the development of missiles for the space program is carried out.

Fr. John S. O'Connor, S.J.

Wheeling College. The chemistry department faculty is conducting a series of lectures on advanced chemistry for gifted high school seniors of the area. Some thirty-five students from seventeen high schools are participating.

Chemistry. Dr. John Hartman, who completed his graduate work at Wayne State University in the field of organic chemistry, has recently joined the faculty. Dr. Jack Pinkus continues to be associated with the department, but is on leave of absence to carry out research at the University of Pittsburgh under a NASA grant.

Fr. Joseph A. Duke, S.J. has received a renewal of his participation contract with the Oak Ridge Institute of Nuclear Studies.

The following lectures have been given in the Chemistry for Industry Series: "Fluid control, theory and basic concept," James F. Mahoney, Jr., College of Engineering, West Virginia University; "Fluid flow, application," John Langan, Worthington Corporation, Pittsburgh; "Heat transfer, theory and application," John R. Carp, Patterson-Kelley Co., Inc.; "Distillation, theory and application," George E. Jones, Jr., Gulf Research and Developing Co., Pittsburgh.

C. H. Sorum of the University of Wisconsin will discuss mathematics for secondary school teachers at a workshop for science teachers on March 19. On March 23, Warren W. Brandt of Kansas State University will conduct a workshop on acids, bases and salts.

Fr. Joseph A. Duke, S.J.

SCHOLASTICATES

Spring Hill. During the past summer Fr. Louis J. Eisele, S.J. conducted a two weeks course in elementary seismology for a group of scholastics. A \$35,000 seismograph station has just recently been put into operation under the direction of Fr. Eisele. A recently constructed building houses \$20,000 worth of equipment located at Spring Hill by the United States Coast and Geodetic Survey. Six seismographs have been mounted in a unique fashion on five steel beams in order to eliminate errors arising from temperature changes on the earth's surface. Fr. Eisele is conducting studies in thermal stress theory.

Mr. Robert J. Paradowski, S.J.

Weston. The Weston Science Colloquium inaugurated its twelfth year with a lecture on the subject, "New challenges in scientific research." Dr. Anthony F. Bartholomay, chairman of the division of mathematical biology of the Harvard Medical School, outlined problems for the research scientist arising from such areas as computer analysis, the greater emphasis on team research, and the growth rate of scientific journals.

Anthropology. This past summer Mr. Edward O'Flaherty, S.J. (N.E.) pursued research work at the University of Pennsylvania in the anthropological study of values.

Biology. Fr. Francisco Perez, S.J. (Phil.) studied bacteriology at Fordham and Mr. Donald J. Plocke, S.J. (N.E.) spent the summer at the Peter Bent

Brigham Hospital working with Dr. Bert L. Vallee on the mechanism of action of the enzyme carboxypeptidase.

Chemistry. Mr. Ramon Katigbak, S.J. (*Phil.*) studied physical chemistry during the summer at Boston College, while Fr. George Farrell, S.J. (*N.E.*) and Mr. Francis Doyle, S.J. (*N.E.*) participated in a research program in the Boston College chemistry department. The following two papers have recently been published by Mr. Roger C. Phillips, S.J. (*N.E.*) with Philip George and Robert J. Rutman: "Potentiometric studies of the secondary phosphate ionizations of AMP, ADP, and ATP, and calculations of thermodynamic data for the hydrolysis reactions," *Biochemistry*, 2 (1963), 501; "Estimates of thermodynamic data for the formation of Mg^{++} complexes of ATP and ADP at zero ionic strength," *Biochemistry*, 2 (1963), 508.

Mathematics. Mr. Hilario Belardo, S.J. (*Phil.*) and Mr. A. Winshman, S.J. (*N.E.*) studied mathematics at Boston College this summer and Mr. Kenneth Siberz, S.J. (*Calif.*) and Mr. John Williamson, S.J. (*N.E.*) studied mathematics at Fordham.

Physics. Mr. James Schecher, S.J. (*N.E.*) taught the first half of general physics to the first year philosophers. Mr. H. Correa, S.J. (*Col.*) worked during the summer under contract with the Weston Observatory on the EV100 long period portable vertical seismometer. Mr. William Callahan, S.J. (*N.E.*) spent the summer on an analysis of computer data for the energy levels of Gd III. This is an extension of the work published by Mr. Callahan in June under the title, "Spectrum of Doubly Ionized Gadolinium," *Journal of the Optical Society of America*, 53 (1963), 695. Mr. E. Howard, S.J. (*N.E.*) studied physics at Fordham during the summer.

Mr. Donald J. Plocke, S.J.

Woodstock. A number of theologians continued their research or took advanced courses during the past summer.

Astronomy. During the past summer Mr. George V. Coyne, S.J. (*Md.*) participated in a Summer Institute of Observational Astronomy conducted by Harvard Observatory with the cooperation of NSF at the Agassiz Station of Harvard College Observatory in Harvard, Mass. A program of observing selected areas of the lunar surface through wide-band filters with the 24 inch telescope and its auxiliary photoelectric equipment was conducted. It is intended to use this data for an investigation of the proposed phase-dependence of lunar colors. A paper describing this research will be delivered to the American Astronomical Society during its Christmas meeting at Georgetown University. A few high dispersion spectra of selected lunar features were obtained with the Cassegrain spectrograph of the 61 inch telescope. Mr. Coyne delivered a paper to the Agassiz group on spectrophotometry of the lunar surface.

A program for determining the distribution of spectral types in the O-B association I Lacerta and a search for peculiar and metallic-line A stars in this association were also carried out. Mr. Coyne will work with Harvard Observatory personnel on the reduction of this data during the course of the year.

Biology. Mr. Robert C. Baumiller, S.J. (*Md.*) spent the summer as Research Associate at Indiana University in the laboratory of Dr. Herman J. Muller. The research dealt with the effects of heterozygous mutants on several strains of virus-containing *Drosophila melanogaster*. It was shown that certain strains have established a relationship with the virus, such that when the virus is removed they are at a selective disadvantage when challenged with heterozygous mutants as compared to the sibling virus-containing line. Other virus-containing strains were shown not to have established this relationship. In these strains, when sibling lines, containing virus or not, are challenged with newly introduced mutants the virus-containing strain was at a selective disadvantage. Work is continuing which will establish the genetic components of this adaptation.

Mr. Roland J. Lesseps, S.J. (*N.O.*) published a paper in a fall issue of the *Journal of Experimental Zoology* entitled, "Cell surface projections: their role in the aggregation of embryonic chick cells as revealed by electron microscopy." During the summer he continued his work at Johns Hopkins University on the electron microscopy of dissociated and reaggregating chick cells.

Mr. Anthony P. Mahowald, S.J. (*Wisc.*) spent the summer at Marquette University, working in the laboratory of Dr. John W. Saunders. The major part of the project consisted in describing the ultrastructure of the chick limb bud with the electron microscope. He also continued his own research project on the ultrastructure of the *Drosophila* ovary, and the study of polar granules in some female sterile mutants of *Drosophila*.

Chemistry. Fr. Charles L. Currie, S.J. (*Md.*) recently published two papers covering part of his doctoral research (see this BULLETIN, March, 1961, for an abstract): "An explosion with methyl azide," *Canadian Journal of Chemistry*, 41 (1963), 1048-49; "The photochemical decomposition of methyl azide," *Ibid.*, 1552-59.

With Dr. Hideo Okabe and Dr. James R. McNesby, he also published the results of research completed in previous summers at the National Bureau of Standards in Washington: "Vacuum ultraviolet photochemistry. VI. Photolysis of cyclopropane with the Xenon resonance lines," *Journal of Physical Chemistry*, 67 (1963), 1494-97. An abstract of the latter work follows:

The photolysis of cyclopropane was carried out at 1470 Å at room tem-

perature. The relative yields of products as well as isotopic analyses of hydrogen, methane, and ethylene resulting from the photolysis of equimolar mixtures of cyclopropane and cyclopropane- d_6 indicate the following primary processes in order of decreasing importance:



Atomic hydrogen probably forms molecular hydrogen by wall recombination. It is suggested that methane and ethane are formed from the methyl radical produced in the reaction:



The mechanisms for the formation of other products are discussed briefly.

Fr. Currie received a Type E grant from the ACS Petroleum Research Fund to conduct research at the Canadian National Research Council, Ottawa in free radical spectroscopy. This past summer he studied the absorption spectra of the allyl and vinyl radicals produced by flash photolysis. The work was carried out in Dr. Donald A. Ramsay's laboratory and will be continued next summer.

Mr. James L. Lambert, S.J. (*N.O.*) completed his doctoral studies at Johns Hopkins University in June. His dissertation in organic chemistry was entitled "Homoenolate anions," and is abstracted below.

The acidity of a hydrogen *alpha* to a carbonyl group is well known and is responsible for many of the reactions of ketones, aldehydes, and related compounds. When a base abstracts an *alpha* hydrogen the negative charge formed is conjugated with the *pi*-electrons of the carbonyl group to form a species known as the enolate anion.

The present studies show that the removal by base of a hydrogen more remote than *alpha* to the carbonyl group can be facilitated by homoconjugation (or ketal overlap between non-adjacent atoms). We call the charged species formed in this case an *homoenolate* anion. The homoenolate ion corresponds to the alkoxy anion of a cyclopropanol (if a *beta*-hydrogen is removed), of a cyclobutanol (if a *gamma*-hydrogen is removed), etc.

Studies of the base catalyzed racemization of (+)-camphenilone (3,3-dimethyl-bicyclo-[2.2.1]-heptane-2-one) and of deuterium incorporation by camphenilone, camphor, and fenchone provided evidence for the existence of homoenolate anions. Infrared spectrometric data and mass-spectrometric kinetic investigations revealed a high stereospecificity in the base catalyzed reversible homoketo-homoenol reaction.

These results bring into consideration the general concept of homo-enolization. A preliminary report on some of these results has been published in the *Journal of the American Chemical Society*, 84 (1962), 4604.

Mr. James F. Salmon, S.J. (*Md.*) spent the month of July at George-

town University as research associate, continuing his study of substitution reactions involving the Co (III) ion.

Mathematics. Mr. Robert Bagnato, S.J. (N.Y.) received his Ph.D. in mathematics from Yeshiva University last June. His thesis gave bounds in any compact set for arbitrary derivatives of solutions of formally hypo-elliptic partial differential equations. A summary follows.

A linear partial differential operator $P(x,D)$ with infinitely differentiable (C^∞) coefficients is called hypoelliptic in an open subset Ω of R^n if an arbitrary Schwartzian distribution (generalized function) T defined on Ω is a C^∞ function in every open subset of Ω in which $P(x,D)T$ is a C^∞ function. A C^∞ function $f(x)$ is said to be in class b (b is a number) in Ω if for any compact subset K of Ω there is a constant C_K such that for x in K and for any n -tuple p , $\sup |D_x^p T(x)| \leq C_K |p|^{b+1} (p!)^b$. Here $D_x^p = (\partial/\partial x_1)^{p_1} \cdots (\partial/\partial x_n)^{p_n}$, $p! = p_1! \cdots p_n!$. A complete algebraic characterization of hypoelliptic operators with constant coefficients was given in 1955 by Hörmander. He showed that for each such operator $P(D)$ there is a maximal constant d , $0 < d \leq 1$, such that for some constants A and C , for any n -tuple p and for $|\xi| \geq A$, $|D_\xi^p P(\xi)| \leq C(1 + |\xi|)^{-d|p|} |P(\xi)|$. Here ξ is in R^n . Such a $P(D)$ is called d -hypoelliptic.

According to Hörmander and Malgrange, a linear partial differential operator $P(x,D)$ is said to be d -formally hypoelliptic in Ω if its coefficients are in $C^\infty(\Omega)$ and: (a) $P(x_0, D)$ is d -hypoelliptic for every fixed x_0 in Ω ; (b) for every compact set K in Ω there exist constants A_K, M_K such that for every x, y in K and for $|\xi| \geq A_K$, $|P(x, \xi)| \leq M_K |P(y, \xi)|$. Elliptic operators are 1 -formally hypoelliptic. A parabolic operator is d -formally hypoelliptic for some d . Our following main theorem includes the known results in the constant coefficient and elliptic cases. Theorem. Suppose in Ω : $P(x,D)$ is d -formally hypoelliptic and has coefficients in class c , $c \geq 1$; $f(x)$ is in class b ; and $P(x,D)u(x) = f(x)$. Then in Ω , $u(x)$ is in class $\max(b, c/d)$.

Physics. Mr. Victor L. Badillo, S.J. (Phil.) was a guest worker in ionospheric physics this past summer at the National Bureau of Standards, Boulder, Colorado. While there he also attended a course in electromagnetic measurements and standards.

Mr. Agerico Esquivel, S.J. (Phil.) received a summer postdoctoral grant from MIT to participate in a solid-state physics program. Among the experimental problems considered were superconductivity of niobium and tin, the Mössbauer effect at liquid nitrogen temperatures, and excess carriers of semi-conductors. Mr. Esquivel presented a paper on the electron microscopy, electron diffraction and x-ray diffraction of monocrystalline viruses at the Sixth General Assembly and International Congress: International Union of Crystallography, which was held in Rome, Italy, September 9-18, 1963. Attendance at the meeting was made possible by a travel grant from the NSF.

Mr. John G. Marzolf, S.J. (Buff.) recently completed his doctoral studies at Johns Hopkins University. The subject of his dissertation was "Single

crystal diffraction profiles for monochromatic radiation." A brief outline of Mr. Marzolf's research is given below:

According to the dynamical theory of X-ray diffraction developed by Darwin, Prins, and others, the diffraction profiles for monochromatic radiation possess a measurable angular width, and in certain cases significant asymmetry. Since these profiles constitute the "instrumental window" in X-ray spectroscopy, detailed information is desirable, especially concerning the asymmetry. This study has made use of the monochromatic radiation obtainable from a Mössbauer source to test the theoretically predicted profiles.

The crystal planes investigated were quartz (101), silicon (111), germanium (111), and calcite (211). These cases include both the symmetric and asymmetric diffraction patterns. A two crystal spectrometer was employed and the angles were measured interferometrically. An IBM 7094 Fortran computer program was written for calculating the theoretical profiles. The main features of the theory, including asymmetry, were confirmed and some minor discrepancies stemming from crystal imperfections were noted.

Mr. Timothy E. Toohig, S.J. (N.E.) continued his project at Johns Hopkins University on data from the interactions of positive pi mesons with deuterium in the Berkeley 72 inch bubble chamber. In particular, studies on the neutral decay modes of the eta and omega mesons were completed. A final report on the Johns Hopkins work on the production and properties of the rho, eta, and omega mesons and a possible phi meson is being prepared for submission to the *Physical Review*.

Mr. Eugene A. Zimpher, S.J. (Buff.) and Mr. Robert W. Dahlke, S.J. (N.Y.) attended an NSF Summer Institute on PSSC Physics and a conference on educational television, both at Fordham University, during the past summer.

Mr. James F. Salmon, S.J.

GRADUATE STUDIES AND RESEARCH

Weston Observatory. Since the New England seismic network was completed (see this BULLETIN for March, 1963, page 56, and for September, 1963, page 208) two hundred distant earthquakes have been detected, including tremors in the Philippines, India, Alaska, Russia and the western United States. About thirty quakes of local origin have been detected. The network shows a reaction to severe weather conditions, including high winds and lightning. The seismometers are capable of distinguishing between storms on land and sea since the earth's oscillations are much more rapid during a storm on land. Four new seismic stations are being planned for the network. Proposed sites are Massena, N.Y., Binghamton, N.Y., Rutland, Vt., and Moodus, Conn.

Mr. David M. Clarke, S.J.

OFFICIAL REPORTS AND NOTICES

The 1963 Meeting at Boston College

FIRST EXECUTIVE COUNCIL MEETING

FIRST GENERAL MEETING

Fr. James W. Skehan, S.J., president of the Association, called the meeting to order at 7:30 P.M., August 25, in the Murray Conference Room of McElroy Commons.

Fr. Skehan announced the appointments to the nominations and resolutions committees. He also announced that the mathematics section would meet twice the following day, from 9:00 to 10:00 A.M. and at 1:45 P.M.

The presidential address by Fr. Skehan followed: "Island arc formation in the Boston College reservoir: a prototype for mountain building activity."

The meeting adjourned at 8:15 P.M.

The members of the American Association of Jesuit Scientists (Eastern States Division) assembled at Boston College for their thirty-eighth annual meeting hereby resolve:

1. That they are sincerely grateful to Very Reverend Michael P. Walsh, S.J., President of Boston College, for his cordial welcome and for his generosity in inviting the Association to meet at Boston College this year. They are sincerely grateful also to Reverend James W. Skehan, S.J., and Reverend John R. Trzaska, S.J., for the efficient arrangements for their stay on the Boston College campus.
2. That they are most grateful to Reverend Charles L. Currie, S.J., editor, and his colleagues for continuing the excellent work of publishing the BULLETIN.
3. That the President of the Association write a letter of condolence to the family of Reverend John Frisch, S.J., of Reverend Joseph Cohalan, S.J., and of Reverend Edward Berry, S.J., former members of the Association who died during the past year.
4. That the President of the Association write a letter of congratulations to Reverend Joseph P. Kelly on the occasion of his fiftieth anniversary as a Jesuit.
5. That the President and Executive Council reformulate a policy with regard to attendance at meetings of the Association by scholastics in the philosophates and theologates.

Edward N. May, S.J.
Frederick J. Dilleuth, S.J.
Joseph B. Hanzely, S.J.

PANEL DISCUSSION

On August 26 at 10:15 A.M., a panel discussion was held in the auditorium of Cushing Hall on the topic, "The future of scientific education and research and Jesuit scientific education and research". The panelists were: Very Rev. Michael Walsh, President of Boston College, Fr. Paul McCarthy, chemistry department, Canisius College, Fr. Joseph Mulligan, department of physics, Fordham University, Fr. Patrick Yancey, department of biology, Spring Hill College.

The various Sections of the Association held their meetings at 1:45 p.m.

FINAL GENERAL MEETING

Fr. Skehan called the final general meeting to order at 9:35 A.M., August 27, in the auditorium of Cushing Hall.

Fr. Timothy Reardon read the report of the nominations committee, nominating Fr. James J. Ruddick of Canisius College for president. A motion was made, seconded, and carried that nominations be closed. Fr. Ruddick was elected by a unanimous vote.

Fr. Edward May read the report of the resolutions committee. A few amendments were suggested. The amended report was then accepted. It reads as follows:

Fr. Charles Currie, Editor, reported on the BULLETIN. He stated that the editorial staff is anxious to receive the frank opinions of the members of the Association on the policy, copy, and format of the BULLETIN; that the last two issues (March 1963 and June 1963) had cost \$725 and \$1,200 respectively, whereas the ten issues preceding these had been published at a cost of \$350 to \$400; that current assets of the Association may limit the next volume to three issues, each costing from \$350 to \$400. Fr. Currie requested that members submit some articles of a controversial nature to provoke discussion among readers of the BULLETIN. He asked members to notify the editor of a change of address. He thanked the staff of the BULLETIN, the news reporters, and, in particular, Mr. George Coyne, S.J., news editor, for their assistance.

Fr. Skehan thanked Fr. Currie for his work as editor and noted the value of the BULLETIN as an up-to-date source of information to Association members, provincials, prefects of study, deans, and principals on the aims, activities, and opinions of the priests and scholastics committed to teaching, studying, and research in science and mathematics.

A motion was made, seconded, and carried that the Secretary's report of the proceedings of the 37th annual meeting be accepted as published in the BULLETIN, Vol. 39, No. 4, December, 1962.

The treasurer, Fr. John O'Connor read his report. Balance on hand as of August 18, 1962 was \$2,762.42; received from colleges and high schools during past year: \$1,372.00; cash disbursements for BULLETIN during the past year: \$2,700.00; balance on hand as of August 27, 1963 is \$1,434.43. A motion was made, seconded, and carried to accept the treasurer's report as read.

Fr. Skehan requested members to notify the new president, Fr. James Ruddick, as soon as possible of dates of late August and early September meetings of other scientific societies so that these could be taken into account in determining the dates of the 1964 meeting of the Association.

Fr. Skehan introduced the question of whether or not laymen on our faculties should be invited to the meetings. Some objected to the idea for the reason that this would interfere with thrashing out problems in science-education which are properly the concern of the Jesuits in our schools. Others were in favor of the idea on the score that attendance by lay colleagues would give the delegates a more complete picture of the aims and trends of our science departments.

Fr. Robert Mullan suggested that there be a panel discussion on the possible ways in which Jesuit colleges and high schools can benefit one another. Mr. William Callahan suggested a panel discussion similar to the one held at this meeting.

The subject of permission required for theologians to attend the annual meeting was brought up by Mr. Eugene Zimpfer. While it is true that a theologian with a doctorate and/or who has prepared a paper may attend the meeting, there are theologians, not in either of these categories, who would profit from attendance at the meeting. It seems that at least one Very Rev. Fr. Provincial is waiting for representation from the officials of the Association. Fr. Ruddick promised that the matter would be taken up at the final

meeting of the Executive Council. It was also suggested by Mr. William Callahan that philosophers be invited.

With regard to the panel discussion on "The future of Jesuit scientific education and research," it was agreed that while the ideas presented by the panelists and the opinions and observations expressed in the subsequent discussion provide substantial material for reflection, no definite conclusions were reached. Therefore, a formal statement of resolutions by the members of the Association is not warranted. Mr. A. J. O'Brien recommended to the president that at the next annual meeting there be seminars on the topic handled in yesterday's panel discussion. It was also recommended that any panel discussion begin earlier in the morning or be held in the evening so that there would be an open end discussion.

One of the charter members of the Association, Fr. Joseph M. Kelley, Loyola High School, Baltimore, praised the work done for the Association by Fr. Joseph P. Kelly, Shadowbrook, who this year is celebrating his golden jubilee as a Jesuit.

Father Skehan then requested the secretaries of each Section to report on election of officers. They reported as follows:

Biology: no election was held.

Chemistry: Fr. Frederick Dilleuth was elected chairman.

Mathematics: Fr. Timothy Reardon was elected chairman.

Philosophy of Science: Fr. Edward MacKinnon was elected chairman; Mr. Vincent Cannella was elected secretary.

Physics: Mr. Timothy Toohig was elected chairman; Mr. William Callahan was elected secretary.

The meeting adjourned at 10:35 a.m.

REV. JOHN J. MACDONNELL, S.J., *Secretary*

PROGRAM OF THE SECTIONS

Biology. Monday, August 26, 1963.

1. *Report on research at the Haskins Laboratory, New York City.* Fr. Alan J. McCarthy.

2. *General discussion: problems of biology departments in our colleges, universities and high schools.*

Chemistry. Monday, August 26, 1963.

1. *Free radical spectroscopy: the allyl radical.* Fr. Charles L. Currie, Woodstock College.

2. *Homoenolate anions.* Mr. James L. Lambert, Woodstock College.

3. *A study in biophysical chemistry: the hydrolysis of ATP.* Mr. Roger C. Phillips, Weston College.

4. *Advanced placement in chemistry at Fordham College.* Fr. Robert D. Cloney, Fordham University.

Mathematics. Monday, August 26, 1963.

1. *Research Institute for Advanced Study.* Fr. Joseph E. Billotti, Woodstock College.

2. *The modern insight into partial differential equations.* Mr. Robert A. Bagnato, Woodstock College.

3. *Critique of learning by discovery.* Fr. James Fischer, Loyola Seminary.

4. *Comparison of Hayden and Finan's Algebra One and that of the SMSG.* Mr. John Murphy, Xavier High School, Concord.

5. *Comments on the SMSG program and the Bezuska program.* Fr. Richard Harper, Loyola High School, Baltimore.

6. *SMSG: some math, some gobbledygook*. Fr. Joseph A. Persich, Canisius High School.

7. *The matrix algebra and elementary functions in twelfth grade*. Fr. John MacDonnell, Holy Cross College.

8. *Improving results in the MAA mathematics contest*. Fr. Timothy Reardon, Fordham Preparatory School.

9. *Lebesgue measure theory*. Mr. Charles J. Zimpfer, Woodstock College.

Physics. Monday, August 26, 1963.

1. *Research for high school teachers: the Cornell program*. Fr. William J. Suchan, McQuaid Jesuit High School.

2. *The Mössbauer effect: today's research at yesterdays prices*. Mr. John G. Marzolf, Woodstock College.

3. *Antiferromagnetic resonance experiments*. Mr. Thomas E. Murray, Syracuse University.

4. *Neutron experiments for the undergraduate laboratory*. Fr. James J. Ruddick, Canisius College.

5. *The optical model of the nucleus*. Fr. William G. Guindon, Boston College.

6. *Multichannel analyzer demonstration*. Fr. John J. Kinnier, Boston College.

Philosophy of Science. Sunday, August 25, 1963.

1. *The basis and development of a philosophy of science (following a Lonergan structure of knowing)*. Mr. Albert Fritch, Fordham University.

2. *Discussion on the above paper*. Discussion leader: Mr. Vincent D. Cannella, McQuaid Jesuit High School.

3. *Discussion concerning next year's program*.

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Editor's note: Three previous indices to the contents of this BULLETIN have been published. Volumes 1 through 25 were indexed in October, 1949 (Volume 25, no. 5); volumes 26 to 30 in May, 1954 (Volume 31, no. 4); and volumes 31 to 35 in May, 1958 (Volume 35, no. 4). With each index a check list was drawn up of the issues of the BULLETIN which had been published during that particular period.

With this last issue of Volume 40 another five-year index is due, along with a listing of the issues of the BULLETIN which have appeared during the years 1958 to 1963. We hope the present index will be helpful both to individual readers and to libraries. (Back issues are available by writing to: Editor, BULLETIN AAJS, Woodstock College, Woodstock, Md.)

We are specially indebted to Mr. G. Harry Hock, S.J. for editing this latest index. Working with him were: Mr. Edward F. Cavey, S.J., Mr. Robert C. Hogan, S.J., Mr. James L. Lambert, S.J., Mr. Roland J. Lesseps, S.J., and Mr. Anthony P. Mahowald, S.J.

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